

partially cylindrical insulator element into the housing, the housing having a higher temperature than the partially cylindrical insulator element at a time of the installation.

AB
CONC'D
10. (Amended) The spark plug according to claim 1, further comprising:

an interlayer produced prior to the connection and by which the partially cylindrical insulator element and the housing are connected with one another, wherein:

the interlayer is one of applied and attached to the partially cylindrical insulator element, and

the interlayer is attached to the housing using at least one material bond.

REMARKS

I. Introduction

Claims 1 to 15 are pending in the present application. In view of the foregoing amendments and following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Applicants note with appreciation the acknowledgment of the claim for foreign priority and the indication that all of the certified copies of the priority documents have been received.

II. Objections to the Drawings

The Office Action objects to the drawings as allegedly failing to comply with 37 C.F.R. 1.84(p)(4) because reference character "10" designates both an insulator and a compact spark plug. The Office Action further objects to the drawings as allegedly failing to comply with 37 C.F.R. 1.84(p)(4) because reference character "10(c)" is used to designate both an insulator and a compact spark plug. The Office Action still further objects to the drawings as allegedly failing to comply with 37 C.F.R. 1.84(p)(4) because the drawings do not include a reference number 106.

Applicants have amended the specification to be consistent with the drawings. Reference characters 10 and 10c designate the spark plug, and reference characters 12 and 12c designate the insulator. The specification has also been amended such that the "step" corresponds to the reference numeral 106d, instead of reference numeral 106. Since the specification has been amended to be consistent with the drawings, Applicants respectfully request withdrawal of the objections to the drawings.

III. Rejection of Claims 1 to 3, 8 to 13 and 15 Under 35 U.S.C. § 102(b)

Claims 1 to 3, 8 to 13 and 15 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 1,485,275 ("Koerber"). It is respectfully submitted that Koerber does not anticipate claims 1 to 3, 8 to 13 and 15 for the following reasons.

To anticipate a claim, each and every element as set forth in the claim must be found in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of Calif., 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). That is, the prior art must describe the elements arranged as required by the claims. In re Bond, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

Amended claim 1 recites a partially cylindrical insulator element, a housing enclosing the partially cylindrical insulator element, and a connection including at least one **material bond** by which the partially cylindrical insulator element and the housing are connected to one another. Koerber does not disclose, or even suggest, the feature of a material bond by which the partially cylindrical insulator element and the housing are connected to one another. Koerber merely provides an insulating body 1 with a metal socket 4. Lines 70 to 71. A screw cap 7 is inside the body 6 of the spark plug, and the screw cap 7 engages an upper shoulder of the metal socket 4. Lines 71 to 77. No material bond is present in Koerber.

It is therefore respectfully submitted that Koerber does not anticipate amended claim 1. As for claims 2, 3, 8 to 13 and 15, which depend from amended

claim 1 and therefore include all of the limitations of amended claim 1, it is respectfully submitted that Koerber does not anticipate these dependent claims for at least the same reasons given above in support of the patentability of amended claim 1.

IV. Rejection of Claims 1 to 4 Under 35 U.S.C. § 102(b)

Claims 1 to 4 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 1,501,368 ("Powell"). It is respectfully submitted that Powell does not anticipate claims 1 to 4 for the following reasons.

Powell provides a nonconducting sleeve 2. This sleeve 2 is secured in the body by a threaded annulus 8. Fig. 2. A soft copper or soft metal gasket may be positioned between the inner end of the annulus 8 and the annular flange. Col. 1, lines 39 to 44. Powell does not disclose, or even suggest, any material bond present in the spark plug; instead, Powell merely provides a mechanical connection of parts.

As Powell fails to disclose, or even suggest, the features of amended claim 1, Applicants respectfully submit that Powell does not anticipate amended claim 1. As for claims 2 to 4, which depend from amended claim 1 and therefore include all of the limitations of amended claim 1, it is respectfully submitted that Powell does not anticipate these dependent claims for at least the same reasons given above in support of the patentability of amended claim 1.

V. Rejection of Claims 1 to 8, 10 and 15 Under 35 U.S.C. § 102(b)

Claims 1 to 8, 10 and 15 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 3,300,672 ("Fisher"). It is respectfully submitted that Fisher does not anticipate claims 1 to 8, 10 and 15 for the following reasons.

Fisher provides a tubular shell 1 which encompasses a bore 8. The insulator 17, 18 and 19 is placed inside the tubular shell wherein an enlarged portion 14 of the insulator interacts with the shell 1. No material bond is present between the bore and the insulator; instead, a mechanical interaction is allegedly achieved.

Fisher further provides a split tube which is pressed into an end of the insulator. The split tube is cemented into the insulator. Col. 2, lines 39 to 42. The cementing is between the split tube and the insulator, but not between the insulator

and the shell. No **material bond** between the shell and the insulator is disclosed or even suggested in Fisher.

As Fisher fails to disclose, or even suggest, all of the features of amended claim 1, Applicants respectfully submit that Fisher does not anticipate amended claim 1. As for claims 2 to 8, 10 and 15, which depend from amended claim 1 and therefore include all of the limitations of amended claim 1, it is respectfully submitted that Fisher does not anticipate these dependent claims for at least the same reasons given above in support of the patentability of amended claim 1.

VI. Rejection of Claim 14 Under 35 U.S.C. § 103(a)

Claim 14 was rejected under 35 U.S.C. § 103(a) as unpatentable over Fisher in view of U.S. Patent No. 4,870,319 ("Benedikt et al."). Applicants respectfully submit that the combination of Fisher and Benedikt et al. does not render obvious claim 14 for the following reasons.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

Claim 14 depends from amended claim 1 and therefore includes all of the limitations of amended claim 1. As discussed above in connection with claim 1, Fisher does not disclose, or even suggest, the feature of a material bond by which the partially cylindrical insulator element and the housing are connected to one another. The addition of Benedikt et al. does not cure the critical defects of Fisher. Benedikt et al. provide a housing 11 which surrounds an insulator 10. As a result,

Benedikt et al. allegedly provide a mechanical interaction between the housing and the insulator 10. Benedikt et al. do not disclose, or even suggest, the presence of any material bond between housing 11 and the insulator 10.

In view of the foregoing, the combination of Fisher and Benedikt et al. does not disclose, or even suggest, all of the limitations of amended claim 1. It is therefore respectfully submitted that the combination of Fisher and Benedikt et al. does not render obvious claim 14, which depends from amended claim 1.

VII. Conclusion

In view of the foregoing, it is respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Attached hereto is a marked-up version of the changes made to the Specification and claims by the current Amendment. The attached pages are captioned "**Version with Markings to Show Changes Made.**"

Respectfully submitted,
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IN THE SPECIFICATION:

The paragraph starting on page 6, line 26, has been amended, without prejudice, as follows:

--Housing 22 is connected to insulator 12 [10] by a welded connection 48. Welded connection 48 extends longitudinally up into threaded sleeve 26 from the end of housing 22 further from the base part. Welded connection 48 extends completely around the circumference lying transverse to the longitudinal direction. A gap between insertion nut 34 and insulator 12 is completely closed by welded connection 48. A gap formed between the end of threaded sleeve 26 further from the base part and insulator 12 [10] is also completely closed by welded connection 48.--.

The paragraph starting on page 8, line 1, has been amended, without prejudice, as follows:

--Figure 2A shows, in a partial section view, a compact spark plug 10c which has no damping resistor. Functional elements shown in Figure 2A which are constructed essentially like those described with reference to Figure 1A have the same reference numbers in Figure 2A but are suffixed with the lowercase letter c. This particularly applies to reference numbers 12c to 36c. Central electrode 20c has a diameter in its main part which is smaller than the diameter of central electrode 20. This allows the diameter of through hole 18c and outer diameter Dc of insulator [10c] 12c to be reduced. Central electrode 20c is coated with a hard solder paste and then inserted through hole 18c into insulator 12c. A contact pin 100, made of, for example, a brass alloy, is inserted into through hole 18c. When terminal stud 36c is screwed in, contact pin 100 is compressed and buckles at multiple buckling positions.--.

The paragraph starting on page 8, line 12, has been amended, without prejudice, as follows:

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--Central electrode 20c is secured by contact pin 100. Insulator [10] 12c is then transported through a high vacuum furnace at a temperature of a magnitude between 600°C and 900°C, for example 800°C. The hard solder paste melts and connects central electrode 20c firmly and permanently with insulator 12c. This connection is also gas-tight. The hard solder paste is, for example, applied in the region of a shoulder 102, at which the inner diameter of through hole 18c decreases. Alternatively, central electrode 20c can be coated almost completely with hard solder paste, so that central electrode 20c and insulator 12c are also connected in the region of insulator base 14c.--

The paragraph starting on page 8, line 21, has been amended, without prejudice, as follows:

--There is an interlayer 104 on insulator [10c]12c which is less than, for example, 1mm thick. Interlayer 104 is connected to insulator [10c] 12c via, for example, a hard soldered connection, in the region of a step [106] 106d of insulator [10c] 12c, which is approximately, e.g., 11= 12 mm long. At the end of step [106] 106d further from the base part, interlayer 104 conforms to the shape of insulator [10c]12c, which widens. In a section 108, however, interlayer 104 forms a tubular section having a larger inner diameter than outer diameter Dc of insulator [10c] 12c. Thus, there is a gap 110 in the region of section 108 between interlayer 104 and insulator [10c]12c. In section 108, interlayer 104 is connected on its outer side with the inner side of insertion nut 34c, for example by a soldered or welded connection. In the region of step [106] 106d, the outer side of interlayer 104 is not connected with housing 22c, so that in this region a gap 111 lies between interlayer 104 and housing 22c.--

The paragraph starting on page 9, line 1, has been amended, without prejudice, as follows:

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--Through the shaping and nature of the attachment of interlayer 104, forces which arise in housing 22c as spark plug 10c is screwed in cannot be transmitted directly to insulator [10c] 12c. Interlayer 104 absorbs these forces in the transition region between step [106] 106d and section 108.--.

IN THE CLAIMS:

Claims 1, 9 and 10 have been amended, without prejudice, as follows:

1. (Amended) A spark plug, comprising:

- a partially cylindrical insulator element;
- a housing enclosing the partially cylindrical insulator element; and
- a connection including at least [one of at least] one material bond [and a friction-lock connection aligned in a radial direction and] by which the partially cylindrical insulator element and the housing are connected to one another.

9. (Amended) The spark plug according to claim 8, wherein:

the connection further includes a friction-lock connection aligned in a radial direction, and the friction-lock connection is produced by an installation of the partially cylindrical insulator element into the housing, the housing having a higher temperature than the partially cylindrical insulator element at a time of the installation.

10. (Amended) The spark plug according to claim 1, further comprising:

an interlayer produced prior to the connection and by which the partially cylindrical insulator element and the housing are connected with one another, wherein:

- the interlayer is one of applied and attached to the partially cylindrical insulator element, and

- the interlayer is attached to the housing using at least one [of the at least one] material bond [and the friction-lock connection].